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CORNELL-DUBILIER ELECTRIC CORP.
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HUNDREDS of Dubilier mica and paper capacitors made over a decade ago and more, are still giving efficient and reliable service in radio and electronic equipment. These capacitors are as good today as the day they were made. We are collecting case histories of such units.

If you know of a Dubilier capacitor ten years old or more, in use today, please tell us all about it and in what type of equipment it is used. A post card will do. Thank you.

◆

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EDITOR, THE C-D CAPACITOR
Cornell-Dubilier Electric Corporation,
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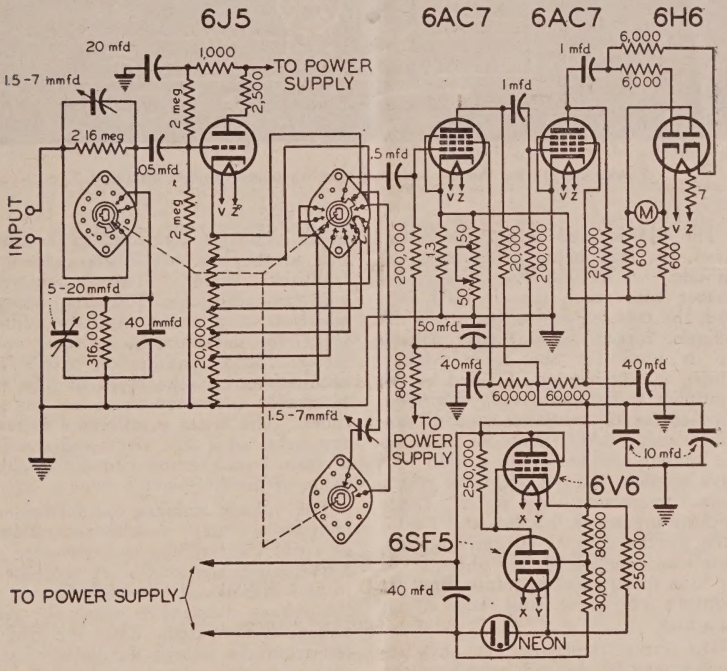
AN A-C V-T VOLTMETER*

A stabilized high impedance system is a feature of the a-c vacuum-tube voltmeter shown in the accompanying diagram. Designed to be used over a frequency range from 10 cps to 1 megacycle, this model, Hewlett-Packard 400A, provides 9 ranges from 0.03 volt to 300 volts in 10 db steps. This makes it convenient to make measurements on a decibel base. The meter is calibrated in db above 1 milliwatt in 600 ohms. The level is obtained by adding or subtracting the meter reading to the db value indicated on the range switch.

The circuit consists of a 3-stage amplifier operated at a rather low impedance level with fixed bias to obtain the necessary gain and flat frequency characteristic. The input terminals are connected to a 6J5 triode through a .05-mfd blocking condenser except on the 100- and 300-volt ranges where a 2.16-megohm resistor, shunted by a 1.5-7 mmfd trimmer, is inserted in series with the grid. This resistor acts as a voltmeter multiplier which is made stable by operating the grid in a potentiometer circuit so that the tube input impedance is constant. The



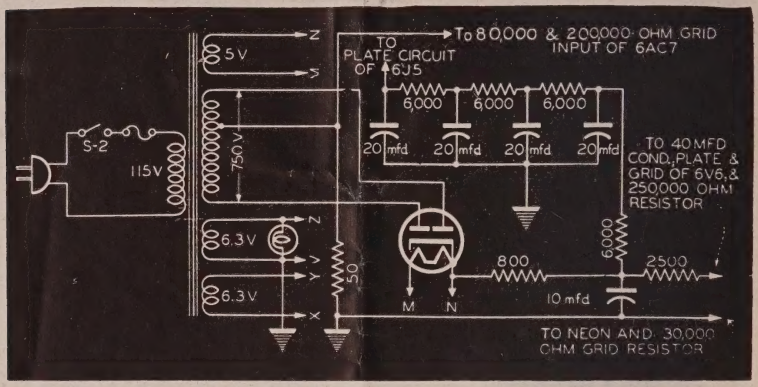
An a-c vacuum-tube voltmeter with a frequency range of 10 cps to 1 megacycle. Nine ranges, from 0.03 volt to 300 volts in 10 db steps, are provided.

* *Courtesy of "Service."*

trimmer is required because of the wide frequency band to be covered. On the 300-volt range a 316,000-ohm shunt from grid to ground reduces the sensitivity and, again, a condenser corrects for frequency.

volt range (multiplier added), and 2.4 megohms on the 300-volt range (multiplier and shunt).

Inversed feedback is employed to improve stability and frequency response. The low potential side of the



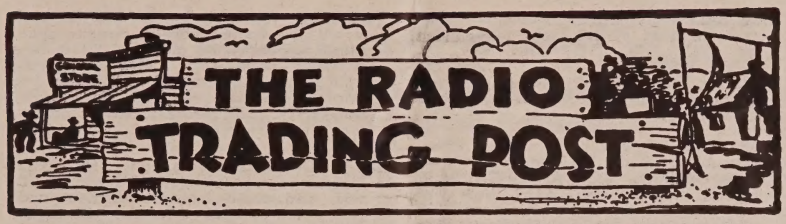
Power supply for the a-c vacuum-tube voltmeter shown on page 3.

The 6J5 is used as a cathode follower, the load being taken from the cathode. A 20,000-ohm wire-wound resistor with seven taps is used as a load, the taps, of course, being for the different ranges. The lowest voltage tap is used for the three highest ranges, selection being obtained by the multiplier and shunt already described. Two stages of resistance-coupled amplifiers using 6AC7 pentodes build up the voltage and feed it to a 6H6 full-wave rectifier, the d-c output of which is used to operate a d-c meter. Large blocking capacitors, 0.5, 0.1, and 1 mfd, keep up the gain at 10 cps, and low plate load resistors, 20,000 ohms, favor the high frequencies by minimizing the shunting effects of tube and circuit capacities.

The input impedance at any frequency may be derived by taking the input capacity, approximately 15 mmfd, and the input resistance, which is equal to 1 megohm from the .03- to the 30-volt ranges, 3.16 megohms on the 100-

meter rectifier is connected to the cathode of the first 6AC7 via a 13-ohm feedback resistor. This is shunted with an adjustable 100-ohm resistor which is used as a sensitivity adjustment for recalibration of the voltmeter. Such recalibration should be required only in the event of tube replacement and, even then, not for all tubes. The meter is calibrated to read rms value of a sine wave and the indication is proportional to the average value of the full wave.

For voltage stability the instrument includes a voltage regulator consisting of a 6SF5 controlling the resistance of a 6V6 triode-connected. A neon lamp in the cathode of the 6SF5 serves as the voltage standard to which the grid voltage is compared. Since the grid is fed from the output d-c voltage, any change in this voltage is amplified and fed to the 6V6 which, in turn, causes a greater or lesser voltage drop in the tube to compensate for the change in output voltage.



A Free Market-Place for Buyers, Sellers, and Swappers.

These advertisements are listed FREE of charge to C-D readers so if there is anything you would like to buy or sell, if you wish to obtain a position or if you have a position to offer to C-D readers, just send in your ad.

These columns are open only to those who have a legitimate, WANTED, SELL or SWAP proposition to offer. The Cornell-Dubilier Electric Corp. reserves the right to edit advertisements submitted, and to refuse to run any which may be considered unsuitable. We shall endeavor to restrict the ads to legitimate offers but cannot assume any responsibility for the transaction involved.

Please limit your ad to a maximum of 40 words, including name and address. Advertisements will be run as promptly as space limitations permit.

FOR SALE—General Industries 12" dual speed turntable and Astatic S-12 crystal pickup $25.00. COD, FOB. Frank Dane, 3852 Eagle St., San Diego 3, California.

WANTED—A ¾-size aluminum bass violin in good shape. Will trade a new 30 to 35 watt 8 tube three channel amplifier with screen tubes, cables and one P.M. speaker, or will pay cash. Sound system value $150. John Arnold, P O Box 84, Bluffs, Illinois.

WANTED—1 or 2 P.M. speakers of 15 or 20 watts and 10 or 12 inch, also a dynamic microphone. New or used. Have radio parts of all kinds and cash. Have 5,000 hard to get new radio tubes, also large 15 in. dynamic speakers and transformers. John Arnold, P.O. Box 84, Bluffs, Illinois.

FOR SALE—H.R.O. receiver, Hallicrafters S-16 and G.E. E-126 12 tube chassis, and 12" speaker 550 kc to 70 mc. W. L. Thiel, 96 Westbury Blvd., Hempstead, N. Y.

SALE OR SWAP — Have portable radio with tubes and new unused batteries. Want phono recorder or 8 mm movie projector. W. M. McDonald, 33A North St., Stoneham 80, Mass.

SWAP — Have deluxe wireless record player. Want 8 mm movie projector. W. M. McDonald, 33A North St., Stoneham 80, Mass.

WILL SWAP—Assorted parts for used but useful test equipment. Have 6L6, 27, 30, 42, 6F7, 80, 6SQ7, 7A4, 7B8, 39/44, 38, 6D6, 6C6, others. C. Shiffman, 80 Hazleton St., Mattapan 26, Mass.

WANTED—One 276A transmitting tube. I could also use a small thyatron tube such as the 2050 or the FG-17 and a couple of 866A half wave rectifiers. Abel Gomes, 8 Duke St., Ludlow, Mass.

WANTED—Riders 10-13, AC signal generator, 1" micrometer. Trade radio parts, light meter, camera, sporting goods, etc. List on request. W. J. Closson, 295—8th Street, Troy, N. Y.

WANTED FOR CASH — Portable recorder and play back, must be in excellent condition. We have for sale RCA Chanalyst in good condition. National Sound Equipment Co., 625 Main St., Worcester 8, Mass.

WANTED—Riders Manuals, vols 8 to 13. Advise price and condition. One vol. or all wanted. Pacific Sales Corp., 426 Larkin St., San Francisco 2, Calif.

FOR SALE—Kolster K20 radios for PM spkrs., Colonial, mod. 38, Majestic table models 320 and 50. Philco, Majestic, RCA, Brunswick, Fada, Crosley radios also Kolster K5 model A power amplifier, brand new. Louis Goldstone, 1279 Sheridan Ave., Bronx 56, New York.

FOR SALE—R.C.P. No. 446 VOM, perfect condition, meter 6 months old, must sell at once, $15 cash. Send deposit, bal. COD. Pvt. S. Friedman, c/o David Friedman, 1759 W. 7th St., Brooklyn 23, N. Y.

FOR SALE—Brand new 12" PM spkr., cutting head, Dodge generators, etc. Send for list. Harry Kay, Rt. 2, Box 255, Imlay City, Mich.

FOR SALE—Just arrived a complete shipment of hard to get radio tubes, such as 35Z3, 35Z4, 35Z5, 35L6, 1A7, 80, 12SA7, 12SK7, 12SQ7, 6A7, 6A8, 1R5, etc. Supply limited. Order filled as received. V. Kozma, 3104 Wilkinson Ave. 61, New York, N. Y.

FOR SALE—2 speed 12 in. G.E. turntable with Astatic model B-10 pickup, mounted, new condition, $25. Also RCA Junior crystal pickup (used) $3.50. New Univex 8 mm movie camera, model B-8, with two rolls No. 100 Ultrapan Film, $11. L. M. Munger, DeKalb, Ill.

FOR SALE—Late Sprayberry radio course, complete, good condition. Make me an offer. Frank P. Martin, 1990 Ford Drive, Cleveland 6, Ohio.

FOR SALE—Four each CK501X, CK507AX, Five each CK502AX, 505AX, CK506AX, new Raytheon hearing aid tubes. Pigtail leads, no base, suitable for battery portables. Make me an offer. All replies answered. F. J. Connor, 3449 Thomas Ave., North Minneapolis 12, Minn.

FOR SALE OR TRADE—N.U. type 2031 Montron 3" picture tube. 5" photo-electric cell in case, 6" cathode ray tube. Wanted: FM tuner complete or kit. G. I. of New Products record-changer recorder. Tubes: 25D8, 25B8, 70L7, 12B8, 32L7. What have you to trade? All inquiries answered. F. U. Dillion, 1200 North Olive Drive, Hollywood 46, Calif.

SWAP OR SELL—G. I. heavy duty phono motor, 33 r.p.m. variable speed, 110 v., also 12 in. table for same. Interested in outdoor equipment, field glasses, binoculars. Guido Paolini, 88 South St., Westboro, Mass.

FOR SALE—Stancor 60 P transmitter. 90 watts CW, 60 watts phone. Excellent condition. Complete. All coils included. $90.00. F. Hill, W20AV. 315 West Park Ave., Angola, Indiana.

FOR SALE—Six power transformers with attached vibrators for auto radios, also 2-speed phono motor, 12" turntable, Atwater Kent speaker 13/4" voice coil, 1200 ohm field. Will sell or trade, what have you? H. Hansen, 3942 24th St., San Francisco 14, Calif.

WANTED—Late model tube tester, also accurate volt-ohmmeter, or combination tube and set tester. Price must be reasonable. John A. Makuta, Curtisville, Penna.

FOR SALE — Solar capacitor analyzer, model CE Exam-eter. Like new in condition and appearance. Sell for $44.00 cash. Remit by P.O. money order. Clyde W. Wimer, 800 Wampum Ave., Ellwood City, Pa.

FOR SALE—Westinghouse 0-1 m.a. (ac and dc) 3" sq. meter, new in carton, price $10.00. Weston 0-1 amp. dc 301 meter, cartoned, price $10.00. Also have portable radio with brand new batteries (in original cartons) price, $25.00. Gerald Samkofsky, 527 Bedford Ave., Brooklyn, N. Y.

SWAP OR SALE—Power pack for radio builder or experimenter. 6.8 vdc to 160 vdc, also photo-electric equipment and radio course and manuals. Reed B. Gillette, RFD No. 1, Sharon, Conn.

FOR SALE—Assortment of 10 used meter tested 2 v. battery tubes for $3.90. Assortment of types must be left to us. Henshaw Radio Co., 3313 Delavan, Kansas City 2, Kansas.

WANTED — Rider's Manuals, all volumes needed. State price and vol. nos. Roy Court, 15005 Aspinwall Ave., Cleveland 10, Ohio.

WANTED — NRI booklet entitled "Radio Receiver Troubles, Their Cause and Remedy." Will give 50c cash or new $1.50 Pfanstiel permanent phono needle or 1N5GT tube. J. S. Jackson, 166 N. Sierra Bonita, Pasadena 4, California.

WANTED—Circuit of Earl Webber Co's. No. 200 Imperial tube tester, or information as to where it may be obtained. Will gladly pay for costs involved. R. D. Rogers, 3115 Van Buren St., Wilmington 276, Delaware.

FOR SALE—About 1000 ft. of 17 conductor color coded wire for inter-coms. and other purposes. Make me an offer per ft. or will trade for late model Hickok test equipment. University Radio Service, 25 Parker Ave., Buffalo 16, N. Y.

WANTED—Jensen BR101 bass reflex enclosure for 10" speaker. New or used. R. L. Taylor, 32 Mountain Ave., Summit, New Jersey.

FOR SALE — Thordarson T74R28, T74C29, T74A31, T74D32, T75S75, T33S99, T65A73, T53C19, T44C02, T75C49, 2 T68C07. Best offer takes all. Want Thordarson CHT 15P17, 15R05, 15C54, T18C92 and 2 T-14C70. State price and condition. Wm. Wunderlich, 603 Tompkins St., Syracuse, N. Y.

FOR SALE—Hallicrafters receiver, model S-21, Thordarson PA system, 15 watts, T-30W14 model, practically new. 10 meter A.M. mobile transmitter, 15 watts output. Complete nice job, picture of units. T. Clarke, 609 Birch St., Fall River, Mass.

(Continued on page 12)

TRACING RADIO NOISE*

Location of Internal Receiver Noises and Suggested Remedies

Noise service problems can be divided into three categories. In the first may be placed noise that is continuously present while the set is being serviced. In the second, we may put noise that is intermittent. In the third, we can place noise that does not readily develop and must be forced to occur.

When noise is continuously present, the service problem is not too difficult. The most likely offenders are checked at once—volume and tone controls, short-wave switches, and ganged tuning capacitors.

The quickest way to determine if a volume control is noisy is, of course, to rotate it, listening for the typically scratchy sounds that a defective control produces. Tuning the set off a station while rotating the control eliminates the possibility that another source may be responsible for these sounds. Noisy volume controls result when dirt gets between the movable contact and the fixed resistance, or when the composition element wears "thin" in spots. Not only noise, but fading, hum, rise and fall in volume, and distorted reception, frequently result.

Sometimes a noisy volume control produces symptoms that closely resemble those of an open filter capacitor. On one service inspection of this sort, noise, hum, distortion, and decreased volume were the symptoms, and a fairly loud hum was present even when the control was turned to minimum—an almost certain indication of an open filter capacitor. At one point on the control, however, perfect reception, without hum, was received. It was this peculiarity that indicated to the radioman that the control, and not the filter capacitor, was to blame.

After spending a moment checking the volume control, the short-wave switch should be checked. Contacts on these switches frequently become dirty or corroded, causing noise. Not infrequently the switch jaws lose tension. In all these cases, not only noise, but fading and intermittent operation may occur. Moving the switch to and fro from broadcast to short-wave usually intensifies the noise, leading to easy detection of the trouble. Dirty switch contacts can be cleaned with any of the prepared products or by tetrachloride and brush. Tension on loose contacts should be increased.

Ganged tuning capacitors are also checked in the quick, preliminary inspection. Noise occurring during their rotation indicates where the trouble lies. Tuning capacitors become noisy because of dirt, plating blisters, bent plates, or imperfect ground connections. When dirt gets between the plates, the tuners will be noisy over most of the dial. A small brush may be used to clean out large particles of dust. Smaller dust particles can be removed by dropping tetrachloride through the plates with an eye-dropper.

Scraping noises at particular points on the dial indicate bent rotor plates, or blisters. Bent plates are readily repaired; blisters, however, may have to be burned off. A power transformer whose primary is plugged into the line, and high voltage secondary attached to rotor and stator terminal points with test prods, may be used.

When noises occur throughout the rotation of the tuning capacitors, and no dirt is present, imperfect rotor ground springs are to blame. These springs should be removed from their position on the capacitor as-

* *Courtesy of "Radio & Television Retailing."*

sembly, cleaned, polished, and bent to create more tension.

RF and oscillator padding capacitors may also become dirty. It is sometimes difficult to locate this trouble, but turning the screws of the padders slightly back and forth will usually determine whether or not they are noisy. If they are, noise symptoms will be intensified, and reception may sometimes completely disappear, due to dirt particles shorting the plates together.

Tetrachloride can be dropped on these padders to clean them. The screws may be rotated back and forth slightly during the process, but returned, of course, to the same position afterward.

When volume and tone controls, short-wave switch and tuning capacitors have been eliminated as causes of noise, the tubes should be checked.

When noise is continuously present, radio components may be checked by simple mechanical means, such as tapping and wiggling suspicious capacitors, resistances, and leads. When tapping can be regulated so that one unit alone produces noise when struck—no response, or a much lesser response, being received from other units, by sympathetic vibrations —the defective part has probably been discovered.

Noisy by-pass and coupling capacitors generally have other associated symptoms that help identify them. Noisy screen by-pass capacitors, for instance, tend to cause fading, whistles, and squeals, as well as noise. Noisy coupling capacitors are apt to open and produce intermittent low volume. Noisy AVC audio filter capacitors often open intermittently, causing low volume, distortion, and low noise level between stations. When intermittently shrill reception, accompanied by hisses and noise, occurs, a plate by-pass condenser on a detector or AF tube may be opening.

RF and antenna coils, especially on TRF sets, often produce noise. A lug that grounds the coil is frequently used to support it as well, and is soldered directly to chassis. Because of the coil's weight, the solder connection may become imperfect, causing noise and fading. Moving the coil about will intensify the symptoms and help locate the trouble.

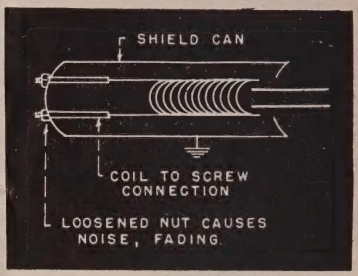


Fig. 1. Poor coil ground can cause noise.

Some of the old-type RF coils are enclosed in cans placed under the chassis. The ground lead of the coil is attached to a screw mounted on the coil form, and a nut on the outside of the can fastens the screw to the can, which is grounded to the chassis. When the nut works loose—a frequent occurrence—noise and fading are produced. Care should be used in tightening the nut, because it is very easy to break the screw off from the coil form. See Fig. 1. A good lock washer helps.

Coil Corrosion

Primaries of IF coils sometimes become corroded at some points due to moisture. The result is a high resistance contact that produces noise. This type of trouble can be detected by using the low range scale on a voltmeter. Place leads across coil terminals — usually from screen to plate — and watch for an erratic deflection of the needle. See Fig. 2. The volume control should be turned to minimum to avoid deflections due to the signal.

To repair this type of defect, the coil will have to be removed from

its shield can and unwound. Green traces on the coil form indicate the corroded area. The break in the wire is generally found at this point. Rewind the wire carefully after repair, duplicating original spacing. Use only high grade rosin core solder.

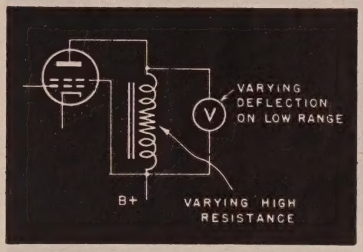


Fig. 2. Corroded coil turns often cause noise.

Poor connections in line cords or plugs produce short, ripping 60 cycle sounds. Tube lighting will be affected. Moving the line cord or plug about will generally reveal the source of trouble.

Aerial leads (the attached types) often open beneath their insulation, causing noisy and intermittently low reception. If noise is intensified while the aerial lead is being shaken, the trouble lies in the lead. To locate the break, hold wire at point C (see Fig. 3), keep section A to C immovable, and shake portion C-D. If noise is not increased, grip wire at B, keep A-B still, shake portion B-D. Keep this procedure up till a noisy section of wire is reached—this will indicate that the area of the break has been located.

Aerials may also short against the chassis, when the insulation wears off in that portion of the lead which comes through the chassis eyelet. This type of short is quickly discovered.

Aerial capacitors may open intermittently, producing noisy, as well as intermittently low reception. Tapping the unit while keeping the aerial lead still usually indicates the source of trouble.

Pushbutton sets frequently become noisy, due to dirty trimmer capacitors on the pushbuttons. This is particularly true of AC-DC midget sets. Tetrachloride dropped on the trimmers, while moving buttons in and out continuously, will repair them.

Imperfect solder connections sometimes cause noise. These bad connections are not always easy to locate. Tapping tests may elicit equally loud responses from all units and connections in a large area, and thus be ineffective. Resoldering all the solder connections in the area under suspicion may take too long.

In obscure cases like these, where continuous noise is present and cannot be located by mechanical or voltage tests, several further test procedures may be used.

A one-tube noise tester may be rigged up (see Fig. 4). On AC sets, the filaments of this tester may be connected in parallel with the 6 volt filament supply. The earphones alone cannot be used for checking noise, because when they are placed across high impedance circuits, load and change of characteristics in these circuits occurs. The high impedance of the tube prevents such changes. With points B. C, and D hooked to set common ground, prod A can be used to probe all suspicious points. Look for trouble where the greatest noise is heard.

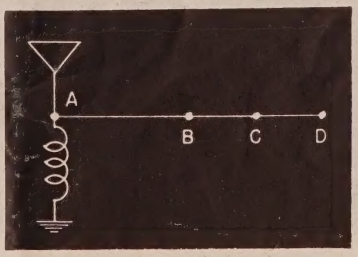


Fig. 3. Finding aerial breaks. See text.

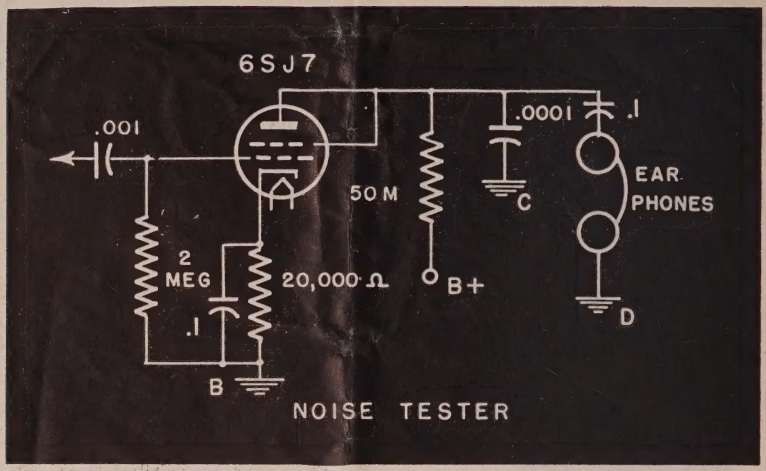


Fig. 4. This one-tube noise tester amplifies and detects noises in any stage.

Radiomen who own signal tracing equipment can use it to good advantage in hunting noise. The same procedure is used as in tracing a radio signal. No test oscillator is required —the noise itself serves as a signal.

Place test probe in order on points 1, 2, 3, 4, 5, and 6 (see Fig. 5). Noise will be evident by fluctuations on the v-t voltmeter. Earphones may be connected and used for more certain identification of the noise.

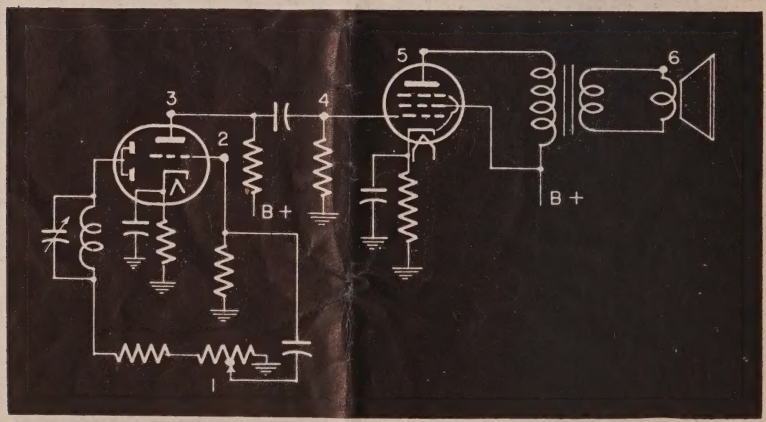


Fig. 5. Locating audio sources of noise. Probe numbered points with signal tracer's "hot" lead.

For RF and IF sections of the receiver, the tuned v-t voltmeter is used—for power supply and AF checking, use AF v-t voltmeter.

If noise is found at the plate of an amplifying tube, test at a B plus terminal. If the noise response is equally great there, the fault probably lies in the power supply, which should be probed.

Localizing Noise

Noise can be localized to particular stages by turning volume control to minimum. If noise remains just as loud at either setting, its source is in the AF or power stages. If noise disappears at this minimum setting, it originates in the RF and IF sections.

If noise is found at the plate terminal of a socket, but not at the grid, check the tube, which may be defective, by substituting a new one. If noise persists, the output transformer may be to blame. When the noise level is much stronger at the plate of the output transformer than at a B plus terminal, the transformer is probably at fault. If the noise level is the same at both points, the transformer may be eliminated from consideration. RF, IF, and AF transformers may be checked in this way.

Where internal noise is not very evident, a test oscillator may be used to bring it out. If the origin of the noise is suspected to lie in the RF, 1st detector, or oscillator stages, connect the test oscillator to set aerial and ground, leaving modulation switch in the unmodulated position.

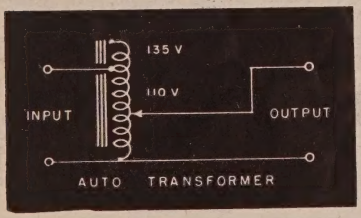


Fig. 6. An auto transformer can step up line.

Feed in a very strong RF signal. The noise will substitute for the customary modulation, and will be received much more loudly than before. Bad tubes are a frequent cause of hum modulation.

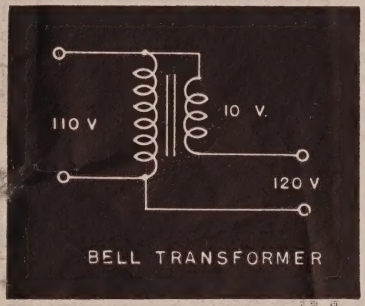


Fig. 7. Bell transformer hook-up for 120 v.

By tapping and moving suspected parts about, the noise may become worse—in which case the guilty unit will be easily detected.

When testing IF stages, procedure is the same, except that an IF unmodulated signal is fed into the grid-cap of the first detector. This IF signal should be even stronger than the RF one previously introduced, since the amplification has been reduced.

Noisy coils, transformers, volume controls, intermittently noisy condensers and resistors are quickly located by this method. Microphonics and acoustic feed-backs are also brought out by this test method.

In cases where noise is the complaint, but fails to appear, it must be forced to occur. Allowing the set to play for several hours in its cabinet may be tried. It may heat up sufficiently to cause the faulty unit to break down and produce noise. Enclosing the set in a box may further reduce the ventilation and speed up the breakdown process.

Stepping up the line voltage often forces an intermittent defect to show

up. An auto-transformer may be used for this purpose (see Fig. 6). A bell transformer may be similarly employed. Depending on the lead connections (see Fig. 7), either 100 or 120 volts will be delivered from a 110 v. power supply line.

Simple mechanical methods should not be scorned in forcing noisy units to go bad. Squeezing a suspected condenser with a pair of long-nose pliers — not too hard, of course — often brings intermittent defects out. Tapping and wriggling parts is also helpful. Heavy pressure from a screwdriver may be used on heavy bakelite case capacitors.

Sometimes light taps and wriggling will prove better than heavy action in getting results. It goes without saying that making sure the guilty unit has actually been located is important.

Not one method, but many methods, may have to be used in hunting down intermittent noises. Where instruments fail, bare-handed ingenuity can succeed.

THE RADIO TRADING POST

(*Continued from page 6*)

FOR SALE—Two GE hot-wire meters, lab. type, 0-150 v. and 0-3 amps. at $3 each. Also RCA oscillograph, mod. TMV 122B complete with instructions and schematic . $65.00. Also radio books. Ralph Hunter, 12 North St., Catskill, N. Y.

FOR SALE—NRI course, back issues Radio News, sporting mags.; old coins, radio textbooks, telescope, .22 cal. rifle, ammunition, lab. chem. equip., etc. Stamp for list. Raymond H. Ives, 822 Windsor Ave., Norfolk 4, Va.

SELL — Triplett signal generator model 1151A, headphones, 1 amp. dry disc battery charger, electric clock, 8" AC electric fan, new tubes one of each: 7Q7, 6Q7, 7B7, 6J5, 7A8, 6K8, 79, 2B7. $50 takes all. Radioman, 2748 Meade St., Detroit 12, Mich.

FOR SALE — Detect-O-Ray photo electric switch model L-162, new; Junior Executive 2-way inner communications call system, new; Janette rotary converter 32-volt D.C. to 110 volt A.C., like new. All A-1. Best offer. Earl H. Stevens, R. 1, Bourbonnais, Ill.

WANTED — Radio battery A B Power Pack and radio converter for A B Pack to 6 v. storage battery. Paris Ward, Shea, Tenn.

FOR SALE — Guaranteed tubes at OPA list prices. Send for list. Goodwin Radio Shop, Rankin, Ill.

WANTED — Late radio course. Prefer C.R.E.I. Will trade ham built com. receiver with all coils or pay cash. Also want late radio service shop equipment and mimeograph machine. K. H. Stello, 925 Monroe St., N.E., Washington 17, D. C.

FOR SALE OR TRADE — New and used tubes, transmitting and receiving, condensers, chokes, power transformers, etc. also Rolls razor, little used. Want cash or microscope and associated books and equipment. Stamp for list. R. A. Williams, 109½ E. State St., Redlands, Calif.

WANTED—To buy for reasonable price a table radio such as Airline mod. No. 14 BR-521A, or similar make. Also one 12-SA7 tube and one 12SK7 tube. John L. Rhaton, Hill, Va.

FOR SALE—Solar capacitor analyzer, mod. CB 1-60, in A1 condition. First P.O. money order for $32.00 gets it. Clyde W. Wimer, 800 Wampum Avenue, Ellwood City, Pa.

WANTED—Will pay top price for Superior No. 1230 signal generator. Mundy's Home Service, Clifton Forge, Va.

FOR SALE—12 Cetron Photo Cells, type CE-2-C, new and in original cartons, $4 each. Erving Gerlat, 3611 Wright Ave., Racine, Wisconsin.

FOR SALE — One Howard Model 435 Communications Receiver. Paul B. Kuzmak, 67 Buckland Rd., Wethersfield, Conn.

FOR SALE — All types of radio tubes, code machine amplifier, all makes and types of radio parts, ear phones, radio cabinets and radios. If interested, I will give full details. Snyder Radio Service, 30 N. 4th St., Sunbury, Pa.

FOR SALE — RCA station allocator, AC-DC, excellent condition. Best offer takes it. H. W. Gehring, Ga. Tech., Box 1054, Atlanta, Ga.

WANTED — Pflueger fresh water free spool prewar reel and a prewar fresh water solid steel casting pole. State price. Frank A. Witkowski, 32 Daymond St., Trenton 10, N. J.

TRADE — Radio City 446 VOM, or Simpson tube tester, or both for good 35mm camera. State model, lens, and shutter. Also want phono motor. I. Dowbin, 3211 N. 17th St., Philadelphia 40, Pa.

FOR SALE OR TRADE — Tubes and hard to get parts; Riders Manuals, 6 to 11; Triolet tester No. 1501; combination tube tester, high and low scale ohmmeter; condenser tester; A.C.-D.C. voltmeter. Rudy Cucciniello, 422 Crescent Avenue, Chelsea, Mass.

FOR SALE — QST for years 32 through 38 40 and 42 complete; also 45 issues for years 31, 39, 41, 43, and 44. Make offer. Edwin M Renfroe, 505 Ivy St. Jacksonville 6, Fla.

WANTED — Tube tester Supreme model 589; Vedolyzer Supreme model 560A; Supreme model 561 Oscillator, or similar equipment. Also Riders Manuals, 7 and up. State price. J. Shumilak, 3106 N. 76th Ave., Elmwood Park 35, Ill.

FOR SALE — Model BN C-D capacity analyzer, new, with tubes, instructions and leads. Also new Alliance AC phono motor 78 RPM. with turntable $7.50. L. Fialkoff, 143-48 41st Ave., Flushing, L. I., N. Y.

WANTED — Wireless phono oscillator. Guy P. Jennings, 239 Washington Ave., Covington, Va.

WANTED — Riders volumes 6 and 8. Weston 301 0 to 1 ma., 3A8tube, RCP multitester, 12, 25, 35, 50, 117 volt tubes. Send list and prices. North Side Radio Service, 653 E. 19th St., Indianapolis 2, Ind.

FOR SALE — 3" Westinghouse 0-1 ma. meter $7; Gordon phono motor $19.50; Ind. Quietone Filter $6; Webster XTAL pickup complete $5.25. A. O. Gioia, 41-18 29th St., Long Island City 1, N. Y.

SWAP — Frigidaire D434 complete except the box for good AC electric radio or $25 cash. Pennington's Garage, Wauneta, Neb.

FOR SALE — Supreme 550 analyzer in new condition. Best offer gets it. Also Riders Manuals 1 to 7 in good condition. Thomas D'Addario, 135-45 117th St., Ozone Park 16, N. Y.

SALE OR SWAP—Stereo lumar 10 power binoculars. Want EC-1 receiver, 4x5 photo enlarger, RCA Voltohmyst, Jr., VOM, etc. Will pay difference on items traded. R. Jos. Flowers, 33 N. 18th St., Harrisburg, Pa.

WANTED — Riders Manuals, tubes, combination table model radio, or testing instruments. J. Music, 206 E 40th St., New York 16, N. Y.

WANTED—Triplett 1213 tube tester, good condition. Give description and price. All letters answered. Cash. Bert Buckner, 280 W. Central, St. Paul 3, Minn.

WANTED — 70L7, 32L7, 117Z6, 117L7 tubes. Must be new in sealed cartons. Will pay cash or trade for other types. Leading Radio Service, 114 E. 3rd St., Mount Vernon, N. Y.

WANTED—Jensen JHP-52, 15" speaker, also set of Meissner iron core band expanding i.f. transfs., used RCA TRK-12 television receiver. E. P. Schoeneck, Rt. 2, Box 16, Wahpeton, N. Dakota.

SELL OR TRADE—ICS radio course, 51 books, .22 single Remington rifle with shells. Heavy duty phono motor and turntable. Zenith and Crosley mantel radios, various tubes; Ac, dc, battery portable less tubes or batteries, A-K radio, model 627. Bob's Radio Service, 525 Florida St., Laurium, Mich.

FOR SALE—One new Shure Unidyne unidirectional dynamic mike, mod. 559A, high or low impedance, $39.50. Roxy Service, Mitchell, South Dakota.

FOR TRADE—New Weston model 301 thermo galvo., 0-120 mils. for same mod. new 0-200 dc microammeter. M. L. Snedeker, 5300 Archmere Ave., Cleveland (9), Ohio.

WANTED—Experienced radio man, draft exempt, or discharged veteran preferred, steady employment or good partnership proposition, good location centrally in the business part of the city. C. B. Saunders, c/o Central Radio Service, Room 203 Latstetter Bldg., Clarksburg, W. Virginia.

WANTED — Capitol Radio Engineering Institute course, section two. State price and condition. G. K. Fulk, 290 Marshall, Mt. Airy, N. C.

FOR SALE — Chevrolet auto radio, model 601574. Will sell for $20. Delbert Shaffner, Deepwater, Mo.

WANTED — Model 030 Philco Dynamic tester in good condition. State price and condition. L. Fialkoff, 143-48 41st Ave., Flushing, L. I., N. Y.

FOR SALE — 15 6F5G tubes, in sealed cartons at OPA list. Send 25% of total for C.O.D. shipment. J. Rosenthal, 6610 Bay Parkway, Brooklyn 4, N. Y.

FOR SALE — Tubes at OPA list prices. Send for list. Wm. Bielamowicz, Bremond, Texas.

TUBES FOR SALE — New, at OPA list price: Send for list. Send deposit, balance C.O.D. Stein, 456 Bedford Ave., Mt. Vernon, N. Y.

FOR SALE—12" Jensen dynamic speaker, attacked power supply; W.E. 540, one large, one small, mag. spkr.; RCA 100A mag. spkr., Universal 2 but. carbon mike. Edmund McD. Bendheim, 22-33 Thirty-first St., Long Island City 5, N. Y.

WANTED—Two each of 12A8GT, 12K8GT, 35Z5GT, 50L6GT, 25Z5, 117L7GT, 25A7, 12SF5GT, 12SF7GT, 70L7GT, 117Z6GT, 43, 45. Leyden Radio Sales & Service, 9651 Franklin Ave., Franklin Park, Ill.

TRADE—All Weston instruments, mod. 433 150 v ac voltmeter, mod. 301 o-1 ma, meter, mod. 301 0-200 microamp meter, mod. 425 0-115 ma rf thermo galv.. Want 10-50 binoculars B&L or Zeiss. Joseph Olidort, 31 West Mosholu Parkway North, New York 67, N. Y.

WANTED—Plug-in model record player to attach to radio, state price, condition, make, also all-wave superhet, table model, give particulars. George Wechsler, 1860 Ocean Parkway, Brooklyn, New York.

FOR SALE—Benwood-Linz auto radio filterpac, type 160 C 4 ST, 8-10 amps., 6v.d.c. Operates all auto radios with P.B. tuning (motor driven or magnetic types). $21.75. Wm. Hrasna, 616 Jackson Ave., Elizabeth 4, N. J.

FOR SALE—Buick Sonomatic auto radio 1941-42, in perfect condition. James Lawless, 496 Pleasant Valley Parkway, Providence, R. I.

WANTED — Old phono records, operatic or concert, Victor Columbia Fonotipia, etc. Also record catalogues, year 1910 or earlier. Will pay up to 25c each for records in good condition. W. Graham, 747 Revere Road, Yeadon, Pa.

WANTED — Radio firms who are engaged in war work, who are interested in disposal of electronic equipment, tubes, or what have you. State full particulars. J. Kozma, 3104 Wilkinson Ave., New York 61, N. Y.

FOR SALE—All popular radio tubes, brand new, also hard to get types, OPA list prices. Send for free listing. Sidney Abrams, 1340 Croes Ave., Bronx 60, N. Y.

WANTED — 8mm movie projector; exposure meter; enlarger; Graflex camera; 8mm color film; contact and enlarging paper; 8mm viewer and splicer; Cinemaster-8 telephoto lens; recorder chassis. Send complete description and price. Charles W. Schecter, R. 2, Muskegon, Mich.

WANTED—Small pocket radio. State condition and price. Pfc. F. A. Centanni, Sec. B, Gore Field, Great Falls, Mont.

WANTED — New tubes 1A7, 35Z5, 35Z3, 50L6, 12SA7, 12AH7, 12A6, 14B8, 25Z5, 25Z6, 70L7, 12SL7, 12SC7, 12A8, 12K8, 14Q7, 6D6, and 25L6. High-8th Appliance Shop, 1460 North High St., Columbus 1, Ohio.

SALE OR TRADE—Detrola, mod. K, F 3.5 Vellostigmat Wollensak Lens, speed 200 sec., built-in light meter, dial exposure guide, case. Kodak V.P. autographic camera, 127 film either camera. Trade for testing equipment or cash. J. Sikorski, 32 Beacon St., Newark, N. J.

FOR SALE—25 6B7 tubes, $1.30 list, 30 2B7 $1.30 list, in RCA sealed cartons, 40% off list. Scranton Talk, 317-319 Lackawanna Ave., Scranton, Pa.

FOR SALE—NRI radio course, 50 lessons with extras; NRI television course, 25 lessons, all in good condition. Harold Sedgwick, 162 Weir St., Taunton, Mass.

TUBES TO SWAP—New, sealed cartons and good used, scarce numbers. Want 35mm camera, Argus C2-C3, Kodak 35, slide projector. Want photo equipment and cameras. H. Gursh, 1481 Shakespeare, Bronx 52, N. Y.

FOR SALE OR TRADE—Majestic 130-A battery portable set. Weighs 4¾ lbs. Uses 1 A7, 1 N5 and 1 D8GT tubes. Without batts. Will swap for good make sig. gen. or test equipment. Perfect tubes in set. Peter Shavel, 941 Grand St., Brooklyn 6, N. Y.

FOR SALE—Kolster power amplifier K5, model A, new with 11" D. spkr. Zenith 755 table model with tubes; Majestic table models 310B, 370; 90B with 90 spkr. Colonial Kolster, and Brunswick superhet chasses; RCA 46 with tubes. Louis A. Goldstone, 1279 Sheridan Ave., Bronx 56, New York.

WANT—Superior tube tester, model 1240, sig. gen. mod. 1130 or 1240, channel analyzer; Majestic tube No. 4S. ½ or ¼ elec. motor, good or burnt out, Rider's Manuals, 1 to 12. Clarence W. Hull, Radio Service, Mineral Springs, Pa.

FOR SALE—Loud speakers, all sizes and fields, some p.m. Magnavox, Utah, Philco, Motorola, etc. Also 6v. fields. Power transf. for older types using 2½ v. tubes. William Tucker, 393 Elizabeth Ave., Newark 8, N. J.

CASH—For small tube checker up to 50v. satisfactory. William Lent, c/o Droutman, 315 9th Ave., New York City.

FOR SALE—Tubes available in most types, new in sealed cartons. Send in your AA-1 MRO rating. Valley Radio-Electric Service, 867 Broad St., Central Falls, R. I.

FOR SALE OR TRADE — 6.00x16 new tire reliners, cord and composition, full molded construction. Four for $5, or trade for radio tubes 1A7, 1N5, 1H5, 1Q5. Savage Auto Supply, Granby, Mo.

WANTED — MRE LF90 converter and model 1240 Superior tube tester. Cash. John Lininger, 3942 Drexel Dr., Toledo, Ohio.

FOR SALE — Hickok model AC49 Mutual conductance tube tester. Supreme Radio Analyzer, model 333. First and second i.f. transformers tuned to 456 k.c., and the following tubes: 1S5, 6F5, 6H6, 6K8, 6SJ7, 6SK7, 6V6, 7A8, 7B6, 7C5, 2-7Q7, 12A8, 14B6, 25Z5, 31. Instruments good condition; parts new. Will not sell separately. Price $100. D. L. Dokus, 115 34th St. N.E., Canton 3, Ohio.

FOR SALE — VOM $13.50; Trumph Tube Tester, model 400, $18 cash with order. Will ship F.O.B. Will buy 50L6, 35L6, 25Z5, 25Z6, 117Z6. F. Cabon, 1504 LaBaig, Los Angeles 28, Calif.

FOR SALE — 2 Brush RC-20 cutting heads, $15 each; 1 Meissner FM Tuner $40. F.O.B.;2 Inca TF64 Audio Output Transformers for 6L6 high fidelity. Frank Dane, 3852 Eagle St., San Diego 3, Calif.

FOR SALE — Large assortment of radio parts and supplies. Let us know your needs. Fred Craven, 2216 S. 7th St., Philadelphia 48, Pa.

WANTED FOR CASH — United type LS-845 Audio Transformer. Paul H. Thomsen, 903 Philadelphia Ave., Silver Spring, Maryland.

TRADE — Transmitter parts from power transformers to meters for Stancor transmitter over 40 watts input. Write for list and describe your transmitter. E. L. Thompson, 1551 Charon Rd., Jacksonville 5, Fla.

TRADE — HY-75 (new in original carton) for new HY-615. Will pay cash for UHF equipment and high voltage tubes. Richard Cass, 18 Shornecliffe Road, Newton 58, Mass.

WANTED — Late N.R.I. or any radio course. Send information as to year, price, and condition. Xavier Curio, 1729 Victor St., Bronx, N. Y.

FOR SALE — Meissner analyst $96; RCP 411 VOM $25; Precision tube tester $35; Capacity analyzer $26.50. Marvin Cohen, 104 S. Maryland Ave., Atlantic City, N. J.

FOR SALE—Sun-Kraft ultraviolet ray lamp, mod. A-1, $63 cash. Tom Davis, Cave Spring, Ga.

FOR SALE—Dry can condenser blocks, 2, 3, 4 sections. Exact replacements for wet Mershons, etc. All 8 and 16 mfd. per section at 450 v., also tubular dry electrolytics, 8 mfd., 475 v. William Tucker, 393 Elizabeth Ave., Newark 8, N. J.

WANTED — Carborundum crystal detector unit, consisting of crystal, battery, rheostat, in moulded case, used in late 20's, in crystal and reflex sets. Cash awaits. Lloyd L. Melton, Electric and Radio Shop, Norwalk State Hospital, Norwalk, California.

WANTED — A Radio City Products multitester, model 411. State condition and price. Harold Levine, 72 East 96th St., Brooklyn, N. Y.

FOR SALE — Carron Signal amplifier in very good condition, with all test leads. New, was $44. Highest offer takes it. Donald Pettera, Box 96, Fennimore, Wis.

FOR SALE — Large quantities of oil-filled paper candensers, all makes, all capacities. Also large quantity of 1, 2, and 3 deck switches, mica condensers, short shaft potentiometers and resistors. All perfect. Write requirements. Kurt Baehr, 3210 Arthington St., Chicago 24, Ill.

FOR SALE — Turner 33D Dynamic mike, $28.50; Utah G12P 12" speaker, $21.60; General Industries phono motor, $14.60; 4 A oil damp pick-up head, $2 pick-up arm, $5. F.O.B. John J. Spankowitch, 239 N. 9th St., Allentown, Pa.

WANTED—Rider's Manuals, 1 to 12, also late tube tester. For Sale 500 watt phone transmitter $300.00. Write Fred W. Rudolph Service, 350 E. Beecher St., Adrian, Mich.

FOR SALE — 5 9002 tubes; 3 HY14 tubes; 8 Millen dial lights. Fox Radio Service, 435 S. 5th St., Richmond, Ind.

FOR SALE — Large variety of tubes. Send for list. M. W. Roybon, Conover, N. C.

WANTED — Table radios, tubes, phonographs. Must be in good condition. State make and price. Spada Enterprises, 10 Lexington St., Wethersfield 9, Conn.

FOR SALE — Magnetic recording head. Perfect. Presto type mounting. What do you have to swap? I have new, sealed critical tubes and cash for new Thordarson T14C70, T90A04, T90S13, R1068. L. D. Harmon, 4208 53rd Ave., Bladensburg, Md.

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